Spring 5-1-2020

Developing a Clinical Practice Guideline for Surgical Diabetic Patients

Barbie Denise Harbaugh
Walden University, bhoover@pct.edu

Diane Whitehead
Walden University

Spring 5-1-2020

Developing a Clinical Practice Guideline for Surgical Diabetic Patients

Barbie Denise Harbaugh

diane whitehead

Developing a Clinical Practice Guideline for Surgical Diabetic Patients

Introduction

Diabetes is a recognized risk factor for postoperative infection, acute renal failure, ileus, and lengthy hospital stay. Poor preoperative glycemic control portends poor intraoperative glycemic control, which is an established risk factor for perioperative morbidity (Turner, et al., 2018). Surgical patients with perioperative hyperglycemia have a higher risk for infection and associated adverse consequences after surgery likened to patients without hyperglycemia. When patients with poorly controlled diabetes present for surgery, they impose a significant financial health resource burden, including prolonged ventilator dependence, longer hospital stay, and greater postoperative loss of productivity (Turner et al., 2018). As the incidence of diabetes increases, optimal screening, management, and scheduling of elective surgery for patients with diabetes has become an issue of increasing significance. Although analysis of the cost-effectiveness of postponing scheduled surgery to treat poor glycemic control in presurgical populations is crucial for enhancing the value proposition of the pronouncement to have surgery, the optimal preoperative care delivery model for diabetes management remains unclear (Turner et al., 2018). Hospitals have been continually exploring methods to reduce operational costs while providing safe efficient delivery of healthcare in a changing healthcare system.

Implementation of the Affordable Health Care Act in 2010 for healthcare reform has been one of the major driving forces to reduce costs in the health care system. Operating rooms have been one of the costliest areas of hospital operations, and with the growing concerns to lower health care costs, hospitals have been faced with multiple mounting financial pressures. Surgical operating rooms are vital resources for patient care and financial profitability and are often the largest contributors to a hospital's financial success. Surgical cancellations can

negatively impact an organization's financial revenue; therefore, efficient utilization of operating room time is critical to reduce expenses (Minor, 2018).

Literature Review

Diabetes is a substantial risk element for problems following many types of surgery. Diabetes increases the incidence of infection, as well as general morbidity and mortality, and is associated with other comorbidities which increase the risk of surgical intervention. Additionally, perioperative short-term glycemic control is associated with poor surgical outcomes both in patients with and without diabetes, underpinning the role of stress hyperglycemia in this relationship (Rollins, et al., 2016).

Glycosylated hemoglobin (HgbA1C) has been used as a measure of diabetic control, reflecting long-term glucose concentrations over the preceding months, and tight control is associated with reduced incidence and slower progression of diabetes related complications, myocardial infarction, and stroke (Rollins et al., 2016). The American Diabetes Association (ADA) released guidelines recommending that target HgbA1C for people with diabetes should be <7%.

Many surgeons and anesthesiologists seek glucose levels < 200 mg/dL on the day of surgery although evidence in the literature suggests that primary care physicians have never ordered baseline HgbA1C on their diabetic patients preoperatively (LaBoone, McLarney, & Reynolds, 2014; Lee, et al., 2014). Acute hyperglycemia during the perioperative period has been studied extensively in the literature. It is also connected to poor clinical outcomes in patients with and without diabetes. This connection is well recognized for hyperglycemia on the day of surgery, within 24–48 hours of surgery, and during the full hospital stay in the literature. Further, insulin infusion protocols designed to prevent hyperglycemia in the perioperative and

postoperative period demonstrate improved surgical outcomes. However, few studies have examined the relationship between preoperative HgbA1C levels and surgical outcomes. Studies in the literature concerning patients undergoing surgery document an association between elevated HgbA1C values and surgical complications, including mortality, cerebrovascular accidents, and wound infection. Persistent chronic hyperglycemia (elevated HgbA1C) is undoubtedly a predictor of long-standing complications of diabetes and is the key target for glycemic control in diabetes. It remains unclear whether chronic hyperglycemia has an adverse effect on surgical outcomes over and above acute perioperative hyperglycemia and whether standards of care that address elevated HgbA1C levels prior to surgery would improve clinical outcomes (Underwood, et al., 2014). The ADA has consistently published guidelines for perioperative glycemic control but there are no specific guidelines for preoperative HgbA1C recommendation for diabetes optimization preoperatively for the elective surgery patient. Because of the deficiency in data, arbitrary HgbA1C cutoffs are used by surgeons, anesthesiologists, internists, and endocrinologists. This rural hospital practiced in this manner.

The American Association of Diabetes Educators has recommendations for the glucose management of the diabetic patient preoperatively, perioperatively and post-operatively with insulin types, sliding scale management and discharge insulin manaement. This professional organization does not address pre-operative HgbA1C recommendations for the diabetic elective surgery patient. The following organizations specific to this project have no preoperative guidelines for optimal HgbA1C levels for the elective diabetic surgical patinet: American Surgical Association, American College of Surgeons, American Society of Anesthesiologists, Anesthesia Patient Safety Foundation, American Assocation of Nurse Anesthestists, and the American Association of Peri-Anesthesia Nurses. These organizations do have some blood sugar

guidelines for the perioperative phase of surgery; however these guidelines do not apply to this project focus.

Background

A struggle to improve operating room efficiency was a significant priority, as health care cost became more challenging in a rural 160-bed acute care hospital in the northwest United States. Given that the epidemiological data suggest that 'good' pre-operative glycemic control is linked with a lower risk of postoperative complications, it has been promoted that HgbA1C concentrations should be optimized before an elective procedure (Levy & Dhatariya, 2019). Stakeholders for this project included the pre-surgical diabetic patients, pre and post operative nursing staff, surgeons, hospital administration, and caregivers. Positive social change may occur for the patients, families, caregivers, and health care providers by improving the diabetic patients' quality of life and the financial outcomes for the facility. Based on current evidence, hospital administration proposed that implementing a diabetic optimization protocol to measure if a patient's health status is optimal during the preoperative, consultation period could reduce operating room cancellations for "change in patient's medical condition" within 48 hours of the surgery date.

In an attempt to decrease the number of unnecessary elective surgery cancellations related to poor diabetes surgical optimization, practitioners in a small rural hospital formed a group consisting of anesthesiologists, nurse anesthetists, surgeons, administrators, endocrinologists, diabetic nurse educator, same day surgery staff, and preadmission testing staff, to establish a clinical practice guideline (CPG) for diabetes optimization. There was no CPG in place at this facility for consistent rulings on acceptable HgbA1C levels for elective same day surgery patients. Given the epidemic levels of diabetes in the overall population, hyperglycemia

around the time of surgery is often identified, with estimated rates of 80% in cardiac and 40% in noncardiac surgical patients (Levy & Dhatariya, 2019). The goal of this project was to review current evidence and guidelines and to develop a CPG (CPG) that could be recommended to this surgical department in a small rural hospital. The practice question was: Based on current evidence, what preoperative diabetic optimization protocol/CPG for adult elective surgery diabetic patients should be recommended for a small rural hospital?

Clinical Practice Guideline

To address the issue of cancelled 1-day surgery cases related to poorly optimized diabetic patients, a CPG was developed to standardize the HgbA1C levels that would be accepted in the preadmission process to proceed with a scheduled surgery. A standardized timeframe for the completion of this HgbA1C test was set for the diabetic patient. Guidelines for the preadmission staff to follow for initiating diabetes optimization by an endocrinologist or the primary care physician when the HgbA1C level was ≥8.5% were developed. Finally, after the optimization had been completed and laboratory tests had met the acceptable level, a protocol was written to reschedule the elective one-day surgery procedure.

The expert panel was initiated to review the initial CPG proposal. The panel consisted of three anesthesiologists, three nurse anesthetists, one endocrinologist, one diabetic nurse educator, one administrator, three physician assistants, two Certified Registered Nurse Practitioners, one vascular surgeon, one general surgeon, and two orthopedic surgeons. The panelists worked with diabetic elective surgery patients on a variety of points in their service of pre-operative care. All panelists hadgreater than 10 years of experince in their field. Table 1 outlines the proposed CPG.

Table 1

Proposed Clinical Practice Guidelines

Step 1.	Patient identified as a possible surgical candidate should be screened when identified as high risk if they have Type I diabetes, Type II diabetes, take insulin, take oral hypoglycemics or have a BMI ≥ 28 kg/m3.
Step 2.	For "high risk" patients, HgbA1C results are to be reviewed if drawn within three months of preadmission center appointment. If not done, HgbA1C test to be drawn as soon as possible.
Step 3.	If patient has HgbA1C result < 8% can proceed with surgery as planned.
Step 4.	If HgbA1C result is ≥ 8%, surgery is postponed, and patient is referred to endocrinology or primary care physician for optimization.
Step 5.	Patient receives handouts, a referral to the diabetes education center and a letter of condition for the endocrinologist or primary care physician outlining the need for diabetes optimization and goal necessary to reschedule surgery.
Step 6.	Patient to return to preadmission center after 8 weeks with a HgbA1C report after optimization if result is < 8%. If level does not meet criteria, optimization will continue until goal level is reached.

Results

Eighteen expert panelists completed a CPG assessment tool utilizing the AGREE II tool. The AGREE II tool (Brouwers et al., 2010) is used internationally to assess the quality of a CPG. The final overall score for the quality of the guideline was 96.2% with all experts stating they recommended the CPG. Fourteen of the expert panelists made the same recommendation to modify the HgbA1C acceptable result from 8.0 mg/dl to 8.5 mg/dl. Six expert panelists recommend adding a periodic review process to ensure evidence-based efficacy for the CPG.

Based on these recommendations, the CPG was adjusted to include these recommendations. Finally, a summative evaluation process can be conducted again after six more months of implementation. More adjustments can be made if needed. The goal for end results is the reduction of surgery cancellations for diabetic patients having elective surgery. The goal reduction in surgery cancellation rate is set for ≤ 5%.

Table 2

Final Clinical Practice Guideline

Step 1.	Patient identified as a possible surgical candidate should be screened when identified as high risk if they have Type I diabetes, Type II diabetes, take insulin, take oral hypoglycemics or have a BMI $\geq$ 28 kg/m3.
Step 2.	For "high risk" patients, HgbA1C results are to be reviewed if drawn within three months of preadmission center appointment. If not done, HgbA1C test to be drawn as soon as possible.
Step 3.	If patient has HgbA1C result < 8% can proceed with surgery as planned.
Step 4.	If HgbA1C result is $\geq$ 8.5%, surgery is postponed, and patient is referred to endocrinology or primary care physician for optimization.
Step 5.	Patient receives handouts, a referral to the diabetes education center and a letter of condition for the endocrinologist or primary care physician outlining the need for diabetes optimization and goal necessary to reschedule surgery.
Step 6.	Patient to return to preadmission center after 8 weeks with a HgbA1C report after optimization if result is < 8%. If level does not meet criteria, optimization will continue until goal level is reached.
Step 7.	A formative evaluation will be completed at the 3-month mark to include an evaluation process post-implementation of the CPG.
Step 8.	A summative evaluation will be completed at the 6-month mark to assess the CPG impact on the rate of unnecessary surgery cancellations.

Strengths and Limitations

Cancellation of elective surgeries on the day of the procedure precedes unproductive use of operating room time and a waste of resources. Day of surgery cancellations also instigate trouble for patients and families. Moreover, day of surgery cancellation creates logistic and financial burden associated with extended hospital stay and repetition of pre-operative preparations as well as opportunity costs of lost time and missed income (Kaddoum, et al., 2016). Having a clinical practice guideline to reduce unnecessary cancellations related to poorly optimized cases, will impact these issues. This clinical practice guideline has been developed for this clinical site but is also applicable to other health care facilities. A significant strength of this project was the support of the stakeholders to agree to be a part of the expert panel. Because a sample from each discipline considered to be a major stakeholder was involved in the critique of the clinical practice guideline, it is expected that adoption of the guideline will be without incident. Buy-in is supported by the

results of the survey. Limitations related to the continued success of the clinical practice guideline would be advanced practice nurse, anesthesiology and surgeon turn-over in practice. It is important for the quality assurance process to stay in effect to ensure continued success.

Lessons Learned

The development of this clinical practice guideline provided an opportunity for me to develop skills as a project manager. The challenge of soliciting input from practitioners in a variety of disciplines allowed me to demonstrate my leadership abilities as outlined in the AACN (2006) DNP Essential II: Organizational and Systems Leadership for Quality Improvement and Systems Thinking. The expert panel also had the opportunity to share their knowledge with each other. The experience of serving together to meet a goal of improving both the patient experience and the financial viability for the hospital may serve as a guide for future decision making.

References

Argo, J. L., Vick, C. C., Graham, L. A., Itani, K. M., Bishop, M. J., & Hawn, M. T. (2009). The association of VA surgeons: Elective surgical case cancellation in the veteran's health administrative system: Identifying areas for improvement. *The American Journal of Surgery, 198,* 600-606. doi:https.doi.org//.10.1016/j.amjsurg.2009.07.005

American Diabetes Association. (2019). Standards of Medical Care in Diabetes-2019. *Diabetes Care, 42*(1), 42-56. https.doi.org//care.diabetesjournals.org

Brouwers M, Kho ME, Browman GP, Burgers JS, Cluzeau F, Feder G, Fervers B, Graham ID, Grimshaw J, Hanna S, Littlejohns P, Makarski J, Zitzelsberger L for the AGREE Next Steps Consortium. AGREE II: Advancing guideline development, reporting and evaluation in healthcare. *Can Med Assoc J. 2010.* 2010. https://doi.org// 10.1503/cmaj.090449

Chorin, E., Finkelstein, A., Banai, S., Aviram, G., Barkagan, M., Barak, L., . . . Steinvil, A. (2015). Impact of diabetes mellitus and hemoglobin A1C on outcome after transcatheter aortic valve implantation. *The American Journal of Cardilology, 9*(32), 1898-1903. doi:https://doi.org/10.1016/j.amjcard.2015.09.032

Dimitriadis, P. A., Iyer, S., & Evgeniou, E. (2013). The challenge of cancellations on the day of surgery. *International Journal of Surgery, 11*, 1126-1130. doi:https://doi.org/10.1016/j.jsu.2013.09.002

Gamble, M. (2013). Six cornerstones of operating room efficiency: Best practices for each. *Baker's Hospital Review*. Retrieved May 12, 2019, from http://www.beckerhospitalreview.com/or-efficiencies/6-cornerstones-of-operating-room-efficiency-best-practices-for -each.html

Houlden, R. L., Yen, J. L., & Moore, S. (2018). Effectiveness of an interprofessional glycemic optimization clinic on preoperative glycosylated hemoglobin levels for adult patients with diabetes undergoing bariatric surgery. *Canadian Journal of Diabetes, 42*, 1499-2671. https://doi.org//10.1016/j.jcjd.2017.12.011

Kaddoum, R., Fadlallah, R., Hitti, E., Jardali, F., & Eid, G. (2016). Causes of cancellations on the day of surgery at a tertiary teaching hospital. *BMC Health Services Research, 16*(259), 1-8. https://doi.org//10.1186/s12913-016-1475-6

Kobak, L. F. (2019). What are clinical practice guidelines? *Podiatry Management*, 41-42.

Lee, G. A., Wyatt, S., Walker, K. Z., Topliss, D., & Stoney, R. (2014). A study of pre-operative intervention in patients with diabetes undergoing cardiac surgery. *Collegian, 21*, 287-293. https://doi.org/10.1016/j.colegn.2013.06.001

Levy, N., & Dhatariya, K. (2019). Pre-operative optimization of the surgical patient with diagnosed and undiagnosed diabetes: A practical review. *Anesthesia 2019, 74*(Supplement 1), 58-66. https://doi.org/10.1111/anae.14510

Macario, A. (2010). What does one minute of operating room time cost? *Journal of Clinical Anesthesia, 22*, 233-236. https://doi.org/10.1016/j.jclinane.2010.02.003

Mendez, C. E., Wainaina, N., Walker, R. J., Montagne, W., Livingston, A., Slawski, B., & Egede, L. E. (2018). Preoperative diabetes optimization program. *Clinical Diabetes Journal, 36*(1), 68-71. doi.org/10.2337/cd17-0088

Minor, D. O. (2018). Implementing a surgical pathway to reduce operating room cancellation rates. *Doctoral Disseratation*. Retrieved from https://scholarcommons.sc.edu/etd/4562

Morshed, A. A., Munn, Z., & Lockwood, C. (2014). Effectiveness of tight glycemic control on mortality and morbidity of patients undergoing cardiac surgery in hospital: A systematic

review protocol. *Database od Systematic Reviews & Implementation Reports, 12*(9), 132-145. https://doi.org/10.11124/jbsrir-2014-1676

Ogurtsova, K., Fernandes, R., & Huang, J. D. (2018). A1c crucial prior to any surgery. *Diabetes Care, 28*(1), 40-50. https://doi.org/10.1016/j.diabes.2017.03.024

Rollins, K. E., Varadhan, K. K., Dhatariya, K., & Lobo, D. N. (2016). Systematic review of the impact of HbA1c on outcomes following surgery in patients with diabetes mellitus. *Clinical Nutrition, 35*, 308-316. https://doi.org///10.1016/j.cinu.2015.03.007

Schweitzer, A. R., Fathy, B., Leib, M., & Rosenquist, R. (2013). The perioperative surgical home. *American Society of Anesthesiologist, 77*(6), 58-59. http://www.asahq.org/~/media/legacy/for%20members/practice%20management/newsletter%20articles/june%202013%20the%20perioperative%20surgical%20home%20model.df

Setji, T., Hopkins, T. .., Jimenez, M., Manning, E., Shaughnessy, M., Schroeder, R., . . . Westover, J. (2017). Rationalization, development, and implementation of a preoperative diabetes optimization program designed to improve perioperative outcomes and reduce cost. *Spectrum Diabetes Journal, 30*(3), 217-223. https://doi.org//10.2337/ds16-0066

Solak, A. K., Pandza, H., Beciragic, E., Husic, A., Tursunovic, I., & Djozic, H. (2019). Elective case cancellation on the day of surgery at a general hospital in Sarajevo: Causes and possible solutions. *Mater Sociomed, 31*(1), 49-52. https://doi.org//10.5455/msm.2019.31.49-52

Talalwah, N. A., & McIltrot, K. H. (2019). Cancellation of surgeries: Integrative review. *Journal of PeriAnesthesia Nursing, 34*(1), 86-96. https://doi.org//10.1016/j.jopan.2017.09.012

Turner, R. M., Ma, Q., Lorig, K., Greenberg, J., & DeVries, A. R. (2018). Evaluation of a

diabetes self-management program: Claims analysis on comorbid illnesses, health care utilization, and cost. *Journal of Medical Internet Research, 20*(6), 207. https://doi.org//10.2196/jmir.9225

Turunen, E., Miettinen, M., Setala, L., & Julkunen, K. V. (2019). Elective surgery cancellations during the time between scheduling and operation. *Journal of PeriAnesthesia Nursing, 34*(1), 97-107. https://doi.org//10.1016/j.jopan.2017.09.014

Underwood, P., Hurwitz, S., Chamarthi, B., & Garg, R. (2014). Preoperative A1C and clinical outcomes in patients with diabetes undergoing major noncardiac surgical procedures. *Diabetes Care, 37*(3), 611-616. https://doi.org/10.2337//dc13-1929